O-27

Simulation on the relation between ferroelectric and piezoelectric hysteresis loops

T.K. Song[1], M.H. Kim[1], W.-J. Kim[2], T.G. Park[3]

[1]*School of Materials Science and Engineering, Changwon National University, 51140, Changwon, South Korea*
e-mail:tksong@changwon.ac.kr

[2]*Department of Physics, Changwon National University, 51140, Changwon, South Korea*

[3]*Department of Electrical Engineering, Changwon National University, 51140, Changwon, South Korea*

Ferroelectric polarization-electric field hysteresis loops and piezoelectric strain-electric field hysteresis loops of ferroelectric materials are systematically compared especially in the viewpoint of coercive fields. Ferroelectric hysteresis loops were simulated with simple hyperbolic functions by considering linear dielectric responses and non-linear switching responses. And piezoelectric hysteresis loops were simulated with piezoelectric responses of domains. And the simulated hysteresis loops were compared with experimental hysteresis loops of piezoelectric $BiFeO_3$-$BaTiO_3$ ceramics. Based on these results, electric-field dependent piezoelectric constants *d* of samples were calculated.

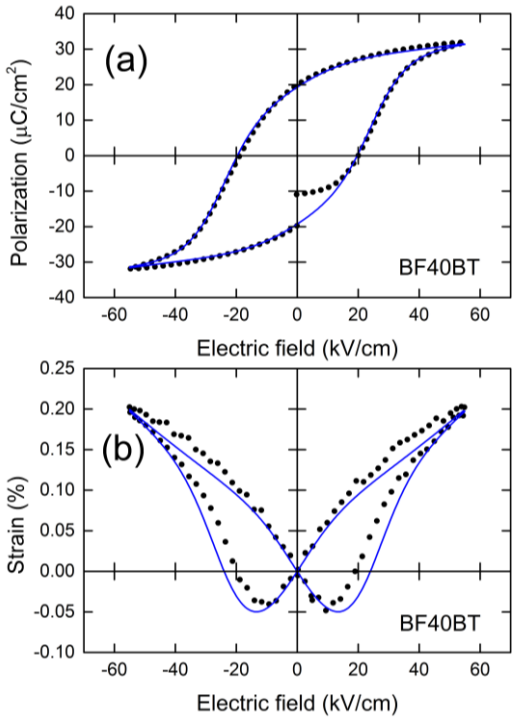

Figure 1. (a) Experimental (symbol) and simulated (line) *P-E* hysteresis loops of $0.6BiFeO_3$-$0.4BaTiO_3$ ceramic and (b) experimental (symbol) and simulated (line) *S-E* hysteresis loops of $0.6BiFeO_3$-$0.4BaTiO_3$ ceramic.

1. T.K. Song, *New Physics: Sae Mulli(Korean)* **67**, 822 (2017).